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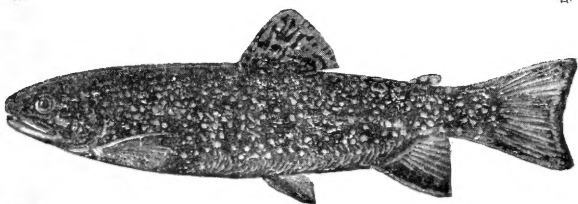
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Class \_\_\_\_\_

Book \_\_\_\_\_

The  
Alaska Salmon  
And Their  
Practical  
Propagation



By  
A. J. Sprague  
Supt. Territorial Hatcheries  
of Alaska (Ter.) Fish Commission

MARCH, 1921

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# THE ALASKA SALMON

## And Their

### PRACTICAL PROPAGATION

By  
A. J. SPRAGUE

Superintendednt Territorial Hatcheries  
of Alaska.

MARCH, 1921.

I am writing this little book, dear reader, for the benefit of the Alaska fishermen, for we are all interested, from the big cannerymen to the little gunny sack fishermen of the spawning streams. I want a little heart to heart talk with all the thousands of Alaska fishermen.

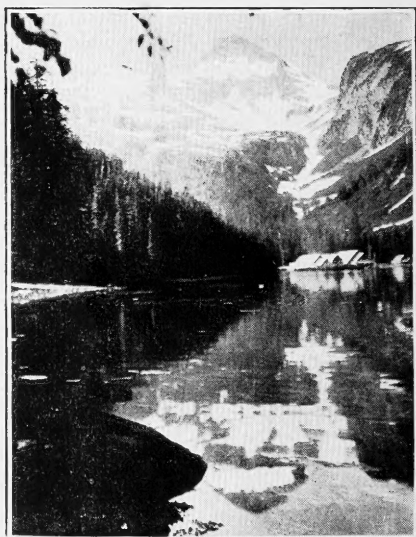
We all live in Alaska and desire to continue our residence here. The fish business is the largest industry in Alaska, and we, as fishermen, must see that it is taken care of and that the industry is not destroyed through greed or lack of intelligent preservation and propagation. This is no one man's job. Everyone must do his part, and that means all of us.

We all know there is something wrong when we have spasmodic runs of salmon in different districts of our inland waters. On off years we always pat ourselves on the back and say, "Oh yes, next year is the big cycle year." And when the fish do not come, we explain it away in one breath by making a goat of the bear, seagulls, fish ducks, all species of trout and other fish eating all the salmon eggs or to storms or lower water stream conditions. It would be good policy for us to be honest with ourselves. We all know that for centuries nature has

provided for all of this loss, and she has fixed, immutable and iron laws. For, to start with, she has never given the power to anyone species to destroy without placing a limit to that destruction. (Frankly I don't believe that there are any more seagulls today than there were twenty years ago.) When any living creatures become too plentiful, nature has her own way to destroy and annihilate them. Just leave it to her. She will establish that balance or equilibrium necessary. Her iron laws hold, from the minutest form of life to man, himself.

Now, just a word about the trout's devouring all the salmon eggs. Possibly it has

#### INLAND PASSAGE SCENE



CANNERY AT BIG PORT WALTER.  
BARANOFF ISLAND

never occurred to one person in a hundred that the young salmon, during his stay in fresh water, before going to his future home in the seas, eat the eggs and young of the trout during their spawning season,

For nature intended this to be so, in order that the trout may not get too plentiful. On the other hand she has given to one female salmon three thousand eggs. Why? So that a few may reach maturity, and the balance feed her other creatures.

Comes now, Mr. Selfishman, and upsets

and destroys, all of this balance. He would take all, and put nothing back. Now make no mistake in this matter, for nature does not intend to stand for any of that kind of stuff. We are only fooling ourselves. It is like the farmer that takes the crops off his land and in turn has to fertilize it, and put in another one. And Mr. Fisherman, that is just what we have got to do with the sea. We have got to put something back, and at least allow a certain per cent. of a yearly run of salmon up to their spawning grounds to seed the beds for the future generation. If we don't we may just as well grab our blankets and say, "To the Pioneer's Home at Sitka for us," or, "Where do we go from here." We can't get in on the Siberian fisheries, for the Japs and Reds have beat us to it. They got there first, and anyhow, just at the present time, we don't know who to make arrangements with yet.

Now let's call a spade a spade in this fish business. All of you fellows know how to get the fish, by all the clever devices set by the ingenuity of man, from the modern floating trap to the gunny sack fisherman of the streams, and why not, all of us help a little bit on the propagation end of this business? Honest now, don't get sore, and lose two weeks' sleep because a few salmon got by your nets and racks during the night of high water, and escaped up stream to seed their spawning beds for the future preservation of the species. Let's take a look into the propagation end of this most important fish question.

#### **ARTIFICIAL RETAINING POND FOR YOUNG SALMON A FAILURE.**

Now what about the Pond retaining, rearing, system for the salmon which of late we have heard and read so much? Take it from me, you can't do it and get results. I paid the price and it came high. Let me tell you that experience is the best and only certain teacher. I built and operated the Trask and Klamath Falls Hatcheries for the State of Oregon in 1909 and 1913, and as Superintendent launched the Pond rearing system March 11th of that year. (See Tillamook Headlight). Now listen, I built some dandy little ponds good enough to swim in. They now have the same kind, at dear old Bonne-

ville Hatchery on the Columbia River, Oregon, where they claim to raise millions of young salmon, taken from eggs shipped from Alaska. They are kept in these small grave like ponds for a period of two years, and then distributed at the cost of about one dollar per fish, four inches long. If they ever should return, are they coming back to those same ponds when matured for spawning? Now I don't believe this, neither does the poor fish.

In retaining ponds for young salmon it is always customary to put a screen in the lower end of the pond in order to keep the young salmon in and trout and other enemies out. Now when the instinct of the salmon asserts itself, he wants and must have his freedom to go to his future home, the sea. And if you compel him to remain in this pond he becomes stunted in growth, and development and, of course, dies.

Take for example, one hundred thousand salmon to be held in a pond for a period of two years in order to protect them until they were good sized fish before being liberated. The following results will take place: (1) Because of the lack of natural microscopic food, found in all tundra water, and that cannot be artificially reproduced, all artificial pond fish go bad sooner or later, usually about the third month. (2) All salmon pass from fresh to salt water by an instinct of nature. They never have consulted any human being as to that time, for they have their own fixed schedule, rain or shine, high or low water. (3) And if they cannot go at their own specified time of the year, they either die, because you have them penned up against their better instinct, or you have stunted their development and growth for all time to come; and, worse still, by continuous confinement and unnatural food, freedom, and environment, you have interfered also with the reproductive organs, and liberated barren fish. The result is thousands of immatured salmon all along the Pacific and inland waters, wanderers in their native element, with no instinct for return to the parent stream to fulfill their mission in life, then spawn and die. (4) Besides having domesticated them, you have robbed them of the vital instinct of self



preservation. (5) With one hundred thousand young salmon liberated in any pond the loss before the end of the second year will be eighty per cent, caused by fungus and parasitic gill disease, and cannibalism, the feeding off of their other weaker brothers by the thousands. Meanwhile, ducks and other water fowl will collect their toll. We must not overlook the fact that it is impossible to furnish their microscopic, insect food found in the tundra swamps and waters that are natural breeding places of the Humpy, Coho, and Chum Salmon. The best artificial food that we can obtain is raw liver, almost prohibitive in cost, limited in quantity, and at best a poor substitute. At the present lowest market price, it will cost a dollar and eight and a half cents each to hold and feed what salmon are left out of this hundred thousand lot, for a period of two years, including, of course, the cost of maintaining, building and general upkeep of these ponds. We can certainly pity these fish, when turned loose into the watery elements in which there is no mercy, having been handled, petted and domesticated, knowing no fear. They eat out of your hand and follow you around the pond, when the dinner bell rings. Now, the question that we may well ask ourselves is, "What becomes of this wreck we have turned loose?" They are less than four inches in length, derelicts with everything their enemies, from the two-legged man on down the line. They never come back to spawn, they will never come back into this pond, where they were reared. And it can make no difference in what manner you mark, tag or mutilate their fins, we can expect no return. All marks are dangerous for young fish.

### EXPERIMENTS

The following experiment was carried out in September 1917. Two hundred thousand fertilized Red Salmon eggs and 80,000 Humpy eggs were planted in the sand and gravel a depth of 12 to 14 inches in a tributary spring stream leading from a small pond on the South side of Chilkoot Lake. It contained no fish whatever, being obstructed a short distance above its outlet into the lake. I found in this body of water no

familiar fungus spores so much in evidence in natural salmon spawning streams that contain thousands of spawning salmon, and it was barren of fish life. Upon closer observation it was found to be a natural pond or stream, with the water distributed from heavy seepage. Fearing the lack of proper food for the young fish after hatching, owing to the lateness of the season, when bugs, flies, gnats and various crustaceous food is not available, I buried in the sand also a short distance from the eggs, to prevent any



WATERFALLS

fungus growth spreading to the buried eggs, the bodies of the parent fish, for their future food supply. (The bodies of the sockeye fish stripped of their eggs.)

A large percentage of these eggs hatched, but if they had been held to the eyed stage, or say within 4 or 5 days of hatching, the result would have been at least ninety per cent. because later experiments proved this. We must bear in mind that salmon eggs brought to this stage of development have not had time to breed the vegetable mold, commonly called fungus. This fungus causes

loss under artificial propagation but not among the alevins or fry in natural conditions. Also, it must be understood, salmon eggs, buried deep in the sand, are not attracted by fungus growth, but when you consider the length of time that the eggs must be buried in the sand, 45 to 90 days under natural spawning, it is reasonable to understand that thousands are destroyed by fungus. But if the eggs are within three or four days of hatching they are safe from fungus or suffocation, piling, or bunching. I carried on these experiments largely at my own expense for two years, and was now broke. This Chilkoot experiment was carried out with the assistance of Mr. F. O. Burckhardt, of the Alaska Pacific Fisheries, who paid for and furnished his cannery tender, the "Chilkoot," with men, nets, native guides, etc. I had asked for assistance from all the cannerymen of Alaska on June 1, 1918, but few responded.

Now what has been the results of this experiment? Mr. M. J. O'Connor, Mr. Henry Roden, Mr. Martin Madsen and natives near Haines reported, that on the 20th of August, 1920, thousands of Humpys were seen in the Bay and Chilkoot Lake. I do not mean to say this is positive proof, but Humpys were seen and this is not a Humpy district. I am getting more information on this point. It means much to us here in Alaska. First, it explodes the theory that the Humpys return in two years and back into the parent stream where they hatched. This was the three-year cycle, and it must certainly apply to this particular district at least—(Note) To my mind, it speaks the whole history of the sea on the question of the return of salmon into the parent stream. Why should salmon pass by hundreds of clear water ideal spawning streams, to enter that one particular stream with apparently no advantage over any other stream? It must establish the homing instinct.

The time is now ripe for me to say that I have studied salmon propagation and spawning conditions in Alaska streams, and what has been accomplished along practical lines in the experiment of stocking, for the first time, barren lakes—devoid of fish life because of impassible falls of water at the

outlet, 50 to 60 feet high. Such bodies of water are alive, however, with natural fish food, where it has accumulated for years in vast storage basins making excellent feeding grounds for young salmon. Thus it is made ideal for the propagation of a continuous food supply for the young salmon that are placed therein; and, as soon as one specie of salmon eggs are hatched, and in course of their allotted time pass to sea, the lake continues to be a self producing food reservoir for the next plant of hatching salmon eggs. Compare for a moment this condition and that of other barren lakes with the two by four gravelike and unnatural retaining ponds at the various hatcheries, with their unnatural environments, lack of shade, rock, snags, and shelter, with costly construction and draining system and expensive maintenance.

**WARM SPRINGS LAKE ON BARANOF  
ISLAND, ALASKA, OR BARANOF  
LAKE IN WARM SPRINGS BAY.**

The area 698 acres, available spawning grounds, inlet streams and tributaries of ten and a half miles, capable of holding and feeding, without any cost whatsoever, one half of the entire output of young salmon (up to the age of their passing to their future home in the salt water) of the annual pack of Alaska. Plants were made in this lake, October 23, 1919, to February 13, 1920. In all, 2,690,000 eyed Humpy and Coho eggs buried in the sand and gravel of this lake. In November 1919 this lake took on its usual winter coat of ice. (This afforded more protection to the eggs and hatched fry planted therein, as no water fowl, of any description could eat or destroy them, and there were no fish in the lake to devour them.)

Let us understand this experiment. Had these eggs been fertilized, and then planted, without being eyed, or been what is commonly known to fish culurist as green eggs, the loss would have been heavy. As before stated the eggs would have accumulated largely in bunches, suffocating them, also, exposing them to the cottony vegetable fungus growth, as there would have been a period or from ninety to one hundred days,

before the hatching stage of the eggs would be reached. Observations on July 6, 1920, from this plant of eggs were made. There was located, and seen throughout the lake and its tundra and tributary inlet streams, in schools of thousands, young salmon of an average length of three and one half inches, in vigorous and healthy condition, and not like the hand reared, domesticated fish, robbed of the instinct of self preservation. One can realize that the cost of maintaining and feeding these fish up to this size and growth without the assistance of a natural feeding ground, provided for by nature, would have entailed an enormous outlay of money. Following out this experiment, we found that these young salmon had passed to sea, the following September,



### HUNTERS RETURN

1920. That is to say the Humpy Salmon had, while the Coho migrated to their future salt water home in October. Owing to the different ages of eggs planted, from October, 1919, to February, 1920, a few remained in the lake, and are still there, while those that passed to sea, of the earlier lot, some were found in the salt water, very safe and sound. They had gone over the fifty-foot falls without injury. Be it understood that these falls have prevented any and all fish from entering this body of water. That probably is the only reason for its being a barren lake. It is not in any sense a mineralized body of water, and is fed by glacier, spring and tundra water. However, if it had been mineralized it would not prevent spawning or breeding salmon from entering.

It has been my observation that we have many heavily mineralized short coast streams in Southeastern Alaska which salmon use as spawning streams in large numbers, as for example, Duck Creek and Knudson Creek near Juneau. By burying the eyed eggs of salmon in the sand or gravel the inherited instinct and the vital impetus is potential in causing the salmon to return to those same streams or lakes to spawn.

In the life study of the salmon, we have to go to nature, in singleness of heart, and work with her, having no other thought but how to best discover her meaning, rejecting and scorning nothing. She long ages ago discovered that the best way to make any race of men, animals or fish strong, and hardy, was not to shield them from their enemies, but to give them power of resistance against their enemies.

#### **ADULT SALMON AND THE NATURAL PROPAGATION.**

These observations cover a period of years from 1907 to the present time.

Young salmon passing from fresh to salt water, their future home in the sea, naturally make for the warmer Japan Current, wherein they find an immense and rich feeding ground. Here is found the floating red shrimp crustacean food, shifted by the tides into immense shoals, acres in extent, giving to the water a reddish appearance. During the winter months thousands of schools of shiners, herring and the young of other fishes are their food. It is true they pass beyond human observation to a large extent, but we have found them not so many hundred miles away from the parent stream where they were hatched. We have with us any month of the year certain species of matured salmon. They swarm back to or near the Coast line. When matured, salmon mill around for days and weeks, adapting themselves for the change from salt to fresh water, at the mouth of the parent stream, selecting their mates, and pairing off while in the brackish water. They are weather prophets. You can always tell by watching the movement of salmon if heavy rains are due, for by instinct they jump and contort for the rains they know

will flood the streams, assisting them to reach the upriver spawning grounds, over the otherwise shallow tributaries and sand bars. It is, indeed, a struggle for the later run of spawning salmon, in the low temperatural glacial water tributary streams, and their remaining strength is yet to be matched by ice obstructions. In the Northern seas, beaten by storms, chilled by ice drifts, tormented by furious contending tides, a horde of seagulls mutilating their bodies, picking out their eyes. Beasts, and fowl, driven with hunger attack them and they match their skill to evade them. With a body rich in oil and fat, nature has truly prepared the salmon for his mission in life. With a wonderful vitality, he hesitates at no barrier, to accomplish his mission at spawning, and to permit his dead body to become food for the young after hatching. Observations on salmon movements throughout our inland waters will show us that the scarcer herring are the smaller are our salmon runs. This is one of the main foods for salmon, halibut, and other fish. We know, of course, that thousands of dead salmon are washed to sea at flood time of streams, after they are through spawning and are covered with sand and gravel. If when salmon spawn in streams entering lakes the decayed bodies of the parent fish are washed into the lake, Nature intends they shall help to produce and increase the natural food supply, along with the organic laden sediment carried therein, where it remains until an over surplus is produced. This year we had low water conditions at all the field stations in this district. I have noticed that the first run of salmon spawned in the lower reaches of streams because they could not reach spawning grounds higher up. The first run of fish spawned here, and the next run used the same beds, gouging and digging up the eggs of the first spawned fish. It would look like a very wasteful process at best on Nature's part.

My next observation was on Admiralty Island, at Sprague Creek, where a rack 125 feet in length was in operation to prevent the salmon trout going up stream with the spawning salmon to feed upon their eggs. Four pairs of salmon entered a small side

stream in which the water was very low and splashed and dug with tails and fins about all night, and when the nest was completed it looked like a fair size shaft about three feet wide and 18 or 20 inches deep, during this process Mr. and Mrs. Salmon seemed very insistent that the nest be just so deep and at this spot. I did not get the reason just then, but after they had spawned and had the nest covered with gravel, this part of the stream went dry. The eggs of salmon have a marked power of apparently suspending life in the moist sand and resuming activities again, when sufficient water arrived. They had evidently by instinct foreseen this before hand, and sure enough, a heavy rain, enough to float a boat over the spawning bed came a few days after the parent fish had died. In the last struggle of life, both fish had run under an underhanging bank, and later both bodies



THE FISHING FLEET

were partly covered with sand and coarse gravel from the recent flood effect of the stream. The one nest that was under my investigation had about 800 eggs therein, and I would say one half were dead on the 10th day, as up to this time I had not disturbed them. Before they had reached the "eyed" stage 200 more were dead, caused probably by nonfertilization. I say they died because of non-fertilization because there was no fungus growth at that depth of gravel, even on spawning streams that are crowded with fish. I have noticed that the male is kept so very busy fighting off trout or other enemies, preventing them from eating the eggs, that he is not always on the spot to fertilize the eggs, and hundreds are washed



down stream by the current and are not fertilized, but serve as food for other fish. One of the most persistent and deadly enemies is the fish known as molly grub, English and Irish lords, bull-heads and by other local names.

Never under natural conditions can you find young salmon in what is known as the "food sac stage" in the stream. For he is buried in the sand and gravel, and he has the inherited power to work up and out of it after the sac is absorbed, even though the bed may be two feet deep in the gravel. Nature provides wonderful vitality for the fry, and he knows by instinct that everything, fish, fowl, and man, is his enemy. Upon the first shadow upon the water like a flash he has gone under rocks and snags. How different from the pond raised fish that feed out of your hand and do not know fear.

No spawning nest seems to have the full amount of eggs of the female, and yet there seems to be only one nest. I do not, of course, understand this part of it. This year's observation discloses during our operation in taking Humpy Salmon eggs an over surplus of seven to eleven spawning males to one female. This species uses largely the short tundra coast stream and brackish estuaries for spawning purposes.

The young fry when hatched first feed on the decayed body of the parent fish, which by this time has gone through a process of purification in the sand, Nature's own laboratory. The flesh disintegrates into small white cornmeal particles. By a wise precaution of Nature this food is available during the late fall or early spring months when flies, bugs, and the larva of insect life are not to be found. By an instinct or scent they find this food. Now, while salmon trout are found in salmon spawning streams eating salmon eggs, don't forget that young salmon are in turn feeding on the spawn and young of the salmon trout for both are brought to the same stream for the same purpose of reproduction. Thus nature holds an equilibrium on all forms of life. The big fish live off the little ones. There is no mercy in the watery elements. It is true that there is an over abundance of salmon trout in some of our streams. But

Nature intends that one should live off the other and her law of balance has been upset by man until the trout hold the upper hand of the salmon in some streams. Young salmon feed very vigorously on the small eggs and young of the salmon trout, until the change from fresh to salt water. Trout of no species do not feed heavily during their spawning period, and the young salmon, which feed heavily on their eggs at this time, will be seen on their spawning beds.

Young salmon also have a decided habit of schooling with salmon trout, but this



Where Trout Abound

apparent friendship lasts only until the salmon completely surround the bunch, and eat them all.

Some interesting facts have been brought to light on such streams as have been racked and screened to prevent the ascent of salmon trout with the spawning salmon. Salmon trout are found in salmon streams only during the spawning season. I mean by this that they are by no means numerous, although many of the smaller size fish may be found. Where there are no salmon trout there are no salmon, for under natural conditions you find one with the other. It is Nature's way of distributing and balancing the food proposition in the watery domain.

I will also state that the larger Dolly

Varden or salmon trout of the short coast streams go to salt water for the winter, but where large lakes are found on the larger streams, they remain in the deep water lakes, for that period. By the means of racking streams a census of the number of spawning salmon and the species therein entering was procured.

Much confusion is due to the marking or tagging of salmon, as no two hatcheries have the same marks. Salmon have been caught in salt and fresh water, mutilated by eels, eagles, seagulls, seals and a host of their numerous enemies, detroying and confusing the marks of identification.

### **"MODERN PROPAGATION."**

At the hatchery of the United States Bureau of Fisheries at Yes Bay, Alaska, in 1907 and 1908, where 50 million Sockeye salmon eggs were taken, and liberated in the food sac stage, in the inlet stream of Yes Lake, was where I first got the "inside hunch" of the failure and breakdown of all our salmon hatcheries. The slaughter of these helpless young salmon was appauling. It is the truth for me to say that if all the host of trout, bullheads, Irish or English lords, or whatever you may call this species of worthless fish, and if all the water fowl had been notified by wireless, "to come and get them," they could not have arrived any sooner. For by the wonderful instinct or scent given by them by Nature, they all got this prepared banquet. It was some feed, to beleve me. I never saw such a contented bunch of trout, fish, and birds in all my life. They really appeared to be friendly towards all of us. It was a revelation to them, and also to me. At the present writing it is a wonderful trout stream, but the salmon are gone. We had been feeding the trout too heavily, increasing their numbers and annihilating the salmon.

I was now thoroughly satisfied that our hatchery system was out of order, and decided to back up a little and see if I could discover a better system, one more like Nature's teaching. I could make no change while in the service of the Bureau of Fisheries so I left Alaska, and through Mr. Henry O'Mally and Mr. Harry McAllister,

the latter a very good friend, who was the Master Fish Warden of Oregon, I secured the position as Superintendent of the Trask River Hatchery near Tillamook, Ore., in 1909. I now started on the pond rearing system, and secured a first class lesson from Nature. I first found that the ponds were so costly to build, they would not justify the great expense involved and began to look for more natural methods. I next took a part of a lot of 90,000 Coho salmon and eyed them in the hatchery. A portion of this same lot I buried in the sand of the stream supplying water for the hatchery. I now let Nature take care of them the balance of the winter. In about three months those eggs had hatched, and the fry came down to the water supply reservoir and into the hatchery. The natural fish on an average were four times as large as those of the same age which had been held and fed in the hatchery. About this same time, I wrote an article for the Tillamook Headlight, under date of March 11, 1909, in which I placed our salmon hatcheries, under the present method of operation, under fire, and advocated the natural retaining pond system. That finished me with the Oregon State Fish Commission. It was a little bit too early for them to learn the truth. However, I got in good again in less than two years, and was sent to Klamath Falls, Oregon, in 1912 and 1913. As Superintendent I organized the Klamath Falls Sportsmens' Club, and erected a hatchery on Spencer Creek, a tributary stream of Klamath River. Here some natural salmon retaining ponds were provided in the natural tributary bed of Spencer Creek. In 1913, I introduced in Southern Oregon, the Colorado Brook Trout. About this time, another political fight was on between Mr. Clanton and Mr. Finley, as to who would have jurisdiction over salmon or trout streams in Oregon. Politics and salmon don't mix well, so in 1914 my work on natural pond propagation for salmon was destroyed through Mr. Clanton.

Political appointments to any position in the fisheries service should be condemned, because they are political appointments, and not because of any inherent objections to the man appointed for no matter how great his

talents or how evident his fitness for the work assigned, the knowledge that his appointment is due to political influence rather than to recognition of merit, will clog his efforts and weaken his ambition, and the constant feeling of insecurity connected with public office will chill his ardor and ambition. And this will always remain so long as we live under our present form of Government subject to frequent elections, spasmodic reforms, and lifting into office of many men whose only claim to consideration is the fact that they had more of a political pull than the other fellow. Eminent talents are rarely known and seldom sought for because the term of office is short, or uncertain, and the encouragement lacking and which makes merit and fitness for service take second place to influence and patronage.

So back I came to Alaska, still determined to solve, if possible, this salmon question. Of one thing I was determined that politics would not queer me again. I was going to use my own money this time, and trust to luck, to get over the rocks and reefs heretofore encountered. In Juneau I met Mr. B. L. Thane, of the Alaska Gastineau Mining Company, and I agreed to stock with trout, barren lakes, including the Salmon Creek drain and upper and Lower Annex lakes. In consideration for this work he was to furnish and equip a hatchery at Thane, Alaska. By so doing I could demonstrate beyond a doubt what could be accomplished with trout in barren waters, and also with our salmon in Alaska. The first trout hatchery in Alaska was established at Thane, Alaska, on January 31, 1917, and the first Colorado brook trout fry were planted in Salmon Creek Dam June 11, 1917. On June 1, 1917, the upper and lower Annex lakes were stocked.

"The *Salvelinus Fontinalis*," dear reader, means only a little "brook trout" and fishermen who know fish and their habits, never have the honor of baptizing or naming any of our favorite fly fishing trout. It is always some scientist, who is giving some scientific name utterly inappropriate to all of them, as for example: Now this brook trout had no idea, that he had ever fallen heir to this wonderful Latin name. It is that way with

all our fish, I never knew a scientist who could catch a poor fish anyhow, unless he was in a tub.

On May 24, 1917, the Alaska Fish and Game Club was organized, with Mr. Charles Goldstein as President, Mr. Charles E. Davidson, Vice-President, Mr. Charles D. Garfield, Secretary and Treasurer, Mr. A. T. Spatz and John Troy who at all times ready to give us publicity and to assist in the fish industry, and myself as Superintendent of field and hatchery operations. The first three officers were Alaskans of long residence in the Territory, enthusiastic sportsmen and well informed upon the game and fish conditions in general. A drive was made for membership which resulted in over three hundred of the business and professional men of the Territory becoming interested.



The members of the Alaska Fish and Game Club and those interested in the preservation of wild life from a scientific or esthetic motives are fortunate when the ends they desire are supported by strong economic and commercial reasons.

Mr Thane donated to the Club the hatchery equipment and it was set up in a building provided by Messrs. Caro and Hooker at a nominal rental, on Front Street in Juneau. The Alaska Electric & Power Co. and the Juneau Water Co. provided light and water service without charge.

When the object and work of the Club became known there was a demand from all over the Territory for trout fry for stocking barren and depleted waters. Another supply of eastern brook trout eggs was obtained and the resulting fry planted in the following waters: Lemon, Lund, Granite, Knudson, Duck, Grindstone, Sheep and Treadwell creeks around Juneau; Upper and Lower Dewey, Black and Icy lakes near Skagway; Fleming Lakes on Chichagof Island and Hesse Creek near Cordova. A small allotment of public funds was made by Gov. J. F. A. Strong to assist in the expense of distribution. While this trout propagation was going on some experimental work was being performed in salmon culture.

It soon became apparent that there was a greater need for salmon experimental and research work than any other so the Club directed its Superintendent to drop all trout investigations and give his entire attention to the salmon. The expense involved in this work exhausted the funds of the Club. Some of the salmon canners who were members of the Club suggested that if an appeal was made to those engaged in the industry the packers would supply the necessary funds to carry on. In June, 1918, a letter setting forth what had been accomplished, the demands of the future, plans for investigations, and requesting contributions of \$200 from each cannery and \$50 from salteries and mild-cure plants making a total fund of \$22,500 was mailed to all interested parties. In response to this appeal the following donations were received:

Acknowledgement is hereby made of the assistance and service rendered by Mr. O. F. Burckhardt, Alaska Pacific Fisheries and the denotation offered by Henry Fortmann, Alaska Packers Association, June, 1918.

Alaska Packers Association.....	\$ 500.
P. E. Harris & Co.....	200
Thlinket Packing Co.....	200
Tenakee Fisheries Co. ....	200.

Total .....\$1,100.

This amount being insufficient for the purpose intended, it was refunded to the payers.

Previous to this a bill was prepared by the Club and its passage secured in the Legislative session of 1917. This bill provided for a commission and carried an appropriation of \$80,000. Owing to some technicalities in its passage the law was illegal and inoperative.

Undaunted the Club struggled along with the work using all its funds, getting an allotment of a few dollars from the Territory, the Superintendent and its active members serving without compensation until the legislative session of 1919, when a law was enacted along the lines of the 1917 bill.

Under this law the present Territorial Fish Commission assumed charge of the operations inaugurated by the Club upon June 10, 1919. The hatchery plant and equipment belonging to the Club valued at \$1,500 was turned over to the Commission for \$275, an amount sufficient to settle the indebtedness of that organization.

The Club was broke but it had accomplished a great service to the Territory and the salmon industry.

The control of the Alaska fisheries is in the Federal Government. The Territorial Commission can only assist by carrying on experimental and research operations, improve natural spawning facilities and restock depleted waters with young salmon. These functions are extremely valuable but must be continued until such time as full authority and control is vested in the Territory.

The work performed by the Commission is stated in its reports which are interesting and instructive and should be read by all engaged in the industry and those who have the affairs of the Territory at heart.

As for example if we had a number of Field Stations on salmon streams equipped with troughs to handle the eggs up to the eyed stage only with this artificial assistance and the planting of the eyed eggs in barren lakes and streams, which in time would be cleared largely of their natural enemies, we could restock and take care of all salmon streams within an area of say 30 miles and would in one stroke do away with the expensive feeding and pond retaining system.



Successful propagation artificially to the eyed stage is therefore the starting point, the object being the natural development to the free swimming stage of the resulting fry with practically the same degree of success as a natural hatch.

In the experiments conducted at Baranof Lake, Chilkoot Lake and various streams in Alaska, apparent success has been achieved in the natural processes resorted to beyond the artificial eyed stage.

By planting eyed eggs in the gravelly beds of these waters, a hatch estimated to be equal in quantity to the eggs deposited, was obtained. In Baranof Lake the fry grew to fingerling size in a few months and migrated to sea early in the Fall. Any maturing salmon from this brood will be prevented from returning to the Lake by the natural barrier between the lake and sea. This will be unfortunate for this phase of the experiment for the parent water theory is no doubt correct. Observations will be made at the pool below the falls of the outlet stream to ascertain if a greater number of fish appear there than heretofore, when their period for spawning arrives.

Eyed humpback salmon eggs planted in a small tributary stream of Chilkoot Lake produced a return of mature fish in three years. None of this variety had even been seen in these waters before.

We have a handicap of weather conditions as related to depositing of eyed eggs in the sand of some species of salmon. But, much in our favor of barren lakes, unpolluted stream and vast irrigation and power projects has not deprived our salmon of hundreds of miles of available spawning streams in comparison with the Pacific States.

In summing up the evidence before us we have the following distinctive features:

1. The conditions which existed before the packing industry started when the natural equilibrium was maintained.
2. Demands upon the natural supply by that industry.
3. The loss in natural supply occasioned by the increased depredations of the

predatory enemies of salmon through its various stages of life.

4. Loss in natural supply through ill advised and improper hatchery operations, unknown until just recently.

5. Failure of all methods, in practice, to augment or maintain the depleted supply.

6. Lack of reliable information relating to important characteristics and habits of the salmon. (Results of natural propagation and the census of streams.)

What knowledge we have regarding these features leads to much speculation and debate. Many ideas, theories and beliefs predicated upon personal opinions and observations are extant. None of these have proven dependable, on the other hand they are often visionary and misleading.

In relation to the 5th feature, it has been practically demonstrated that ninety-five per cent of the eggs properly handled can be brought to the eyed stage, whereas it has been the observation and experience of the writer extending through many years, (that not over five per cent of the eggs of the adult female salmon spawned naturally ever reach that condition.) The causes for this are touched upon elsewhere.

(a) Saving one-half of the cost of plant, equipment and operating expenses.

(b) Eliminating the entire cost of retaining ponds and feeding of the fry.

(c) Preventing the loss of fry in permitting them to obtain natural food in their own way. (And abolishing confinement, which tends toward rendering the species barren.)

(d) Providing for the retention of the natural instinct of self preservation (and liberty of migration.)

These and attending requirements point toward a successful campaign for the building up and maintaining of our salmon supply. Add to this a curtailment of catch consistent with the visible supply and a reasonable hope may be held that the desired end may be accomplished.

In order to obtain properly matured parent fish for the eyeing operations it will be necessary to rack the most prolific streams carrying the desired varieties. (This will afford protection to those fish which

will be permitted to spawn naturally), an opportunity for the invaluable stream census and way for destroying the voracious salmon trout. Observations at our racks during the last two years have shown a remarkable predominance of (male over female fish or the humpback variety.) In some streams the proportion has been as much as ten to one.

Referring to the 6th feature it is true that considerable laboratory and field research work has been accomplished but we are still groping in the dark as to the most salient features and the progress has been so slow it is feared that the salmon will be destroyed from a commercial standpoint, before the important facts can be ascertained.

The passenger pigeon was ruthlessly and wantonly destroyed, the buffalo mercilessly hunted to extinction for their hides at one dollar each, the great forests of the Pacific slope have been unwittingly exposed to axe and fire until their complete destruction is in sight, certain varieties of salmon in the waters of the Pacific States and in British Columbia have been greatly depelted through strenuous over fishing and now the Alaska salmon is facing its inevitable end through lack of proper means for its preservation and protection.

From these lessons of wanton waste and unrestricted operations the people of Alaska must learn the necessity for prompt and effective measures if their great industry is to be preserved.

This is the most important question before the Territory today. It will not permit of procrastination or temporizing as its needs are insistent and demand immediate attention.





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